Marion Sudvarg

Curriculum Vitae

314-698-6997 • msudvarg@mst.edu • www.sudvarg.com

ACADEMIC APPOINTMENTS

Assistant Professor (Tenure Track) *Starting August 2026*
Department of Computer Science, Missouri University of Science and Technology, Rolla, MO.

Postdoctoral Research Associate *June 2024 – August 2026*
Department of Physics, Washington University, Saint Louis, MO.
Supervisor: Professor Jim Buckley

- Developing real-time scheduling theory and platforms for timely, safe, and secure CPS.
- **ADAPT mission:** Software and firmware lead for NASA-partnered suborbital high-energy telescope.
- **AstroRTS:** Established new initiative for real-time computing in astrophysics applications.
- **COSI mission:** Accelerating data analysis workflows for NASA SMEX orbital gamma-ray telescope.
- **ADMX experiment:** Software and firmware development for DoE-led dark matter detector.
- **VERITAS observatory:** Firmware development for ground-based gamma-ray observatory.

EDUCATION

Ph.D. in Computer Science, Washington University in St. Louis *August 2019 – May 2024*
Dissertation: *Improved Models of Elastic Scheduling*
Adviser: Professor Chris Gill

M.S. in Computer Science, Washington University in St. Louis *August 2016 – May 2018*
Graduate Certificate in Data Mining & Machine Learning

B.A. in Physics and Mathematics, Washington University in St. Louis *August 2009 – May 2013*

PREVIOUS EMPLOYMENT

Seiler Instrument, Saint Louis, MO: **Information Systems Manager** *June 2016 – August 2019*

- Directed information systems and software development teams.
- Managed company cybersecurity, including for DoD-controlled technical information.
- Oversaw compliance of government contract clauses related to information systems and cybersecurity.

Seiler Instrument, Saint Louis, MO: **Network Administrator** *July 2013 – June 2016*

AWARDS and HONORS

RTAS Best Presentation Award: Paper [1] *May, 2026*

RTAS Best Reviewer Award *May, 2026*

SIES Outstanding Paper Award: Paper [10] *November, 2024*

ISORC Best Paper Award: Paper [14] *May, 2023*

PhD Honors, Washington University *Academic years 2020-21, 2021-22, & 2022-23*
Received Honors outcome (top 15-20% of students) as a result of annual Periodic Review of Doctoral Students performed by the computer science department.

RTCSA Best Paper Award: Paper [16] *August, 2022*

CPS Rising Star: *May, 2022*
Selected as a Rising Star for the inaugural CPS Rising Stars Workshop held at the University of Virginia.

GRANTS AWARDED

NASA APRA 2025: $1.75M

- Title: “Development of enhanced detectors for the Antarctic Demonstrator for the Advanced Particle-astrophysics Telescope (ADAPT2)”
- Participation: Co-PI
- Award Date: August 2026
- My group will lead the code development for detector simulations, take responsibility for the GRB real-time notification system, work closely with WashU engineers on the development of HDL and HLS for the font-end firmware on the digitizer boards, and will take lead responsibility on development of the flight command, control, data acquisition, and ground-support software.

WashU OVCR Seed Grants for Interdisciplinary Research: $50k

- Title: “Integrated Real-time Control and Scheduling for Multi-messenger Physics Applications”
- Participation: Writer, Funded Postdoc
- Award Date: June 14, 2024
- Notes: This internally funded seed grant funds new interdisciplinary research, requiring a collaboration between at least two schools of the university. I brought together three professors to serve as principal investigators: Chris Gill (PI, Department of Computer Science and Engineering, McKelvey School of Engineering), Andrew Clark (Co-PI, Department of Electrical and Systems Engineering, McKelvey School of Engineering), and Jim Buckley (Co-PI, Department of Physics, College of Arts and Sciences). This seed grant was entirely used to cover my initial equipment purchases and salary for the project.
- Publications: [1], [4], [5], [6], [7], [8], [9], [10], [18], [26], [27], [28], [29], [30], [31], [36], [37], [38], [39]

PUBLICATIONS

Publication Statistics at CSRankings Listed Conferences

Category	Publications	Adjusted Score
Embedded & real-time systems	9	1.712
Operating systems	1	0.167
Total	10	1.879

Computer Science Conference Publications

[1] Daisy Wang, Gregory Kehne, Jeremy Buhler, Filip Marković, Kunal Agrawal, Sanjoy Baruah, Marion Sudvarg. "Real-Time Mult-Telescope Scheduling to Search for Transient Astrophysical Phenomena." IEEE Real-Time Systems Symposium (RTSS), December 2026.

- 🔎 **CSRankings**: Embedded & real-time systems.
- 📊 **ICORE Ranking: A**
- Accepted, to appear.

[2] Daisy Wang, Ye Htet, Jeremy Buhler, Filip Marković, **Marion Sudvarg**. "Suborbital and Orbital Real-Time Localization of Gamma-Ray Bursts via Utility-Guided Coordination." IEEE/ACM International Conference on Embedded Software (EMSOFT), October, 2026.

- 🔎 **CSRankings**: Embedded & real-time systems.
- Accepted, to appear.

[3] Zihan Li, **Marion Sudvarg**, Ching-Hsiang Chan, Ryan Burrow, Nathan Burow, Cailani Lemieux-Mack, Sanjoy Baruah, Ning Zhang, Bryan C. Ward. "Balancing Security and Schedulability: WCET Evaluation and Security Optimization in CPS." IEEE Real-Time and Embedded Technology and Applications Symposium (RTAS), May 2026.

- 🔎 **CSRankings**: Embedded & real-time systems.
- 📊 **ICORE Ranking: A**
- 🏅 **Best Presentation.**

[4] Daisy Wang, **Marion Sudvarg**, Filip Marković, Jeremy Buhler, Sanjoy Baruah, Gregory Kehne. "Probabilistic Response-Time-Aware Search for Transient Astrophysical Phenomena." IEEE Real-Time Systems Symposium (RTSS), December 2025.

- 🔎 **CSRankings**: Embedded & real-time systems.
- 📊 **ICORE Ranking: A***
- 💾 **Artifact** Evaluated.

[5] Ao Li, **Marion Sudvarg**, Zihan Li, Sanjoy Baruah, Chris Gill, Ning Zhang. "A Unified Hardware Performance Profiling Infrastructure to Measure and Manage Uncertainty." USENIX Symposium on Operating Systems Design and Implementation (OSDI), July 2025.

- 🔎 **CSRankings**: Operating systems.
- 📊 **ICORE Ranking: A***
- 💾 **Artifact** Available, Functional, Reproduced.

[6] Mario Günzel, **Marion Sudvarg**, Max Deppert, Ao Li, Ning Zhang, Jian-Jia Chen. "Optimal Priority Assignment for Synchronous Harmonic Tasks With Dynamic Self-Suspension." IEEE Real-Time and Embedded Technology and Applications Symposium (RTAS), May 2025.

- 🔎 **CSRankings**: Embedded & real-time systems.

- 📊 **ICORE Ranking: A**

[7] **Marion Sudvarg**, Andrew Clark, Chris Gill. “Integrated Real-Time Control and Scheduling for Safety Critical Cyber-Physical Systems.” IEEE Real-Time and Embedded Technology and Applications Symposium (RTAS), May 2025.
- 🔎 **CSRankings**: Embedded & real-time systems.
- 📊 **ICORE Ranking: A**

[8] **Marion Sudvarg**, Daisy Wang, Jeremy Buhler, Chris Gill. “Subtask-Level Elastic Scheduling.” IEEE Real-Time Systems Symposium (RTSS), December 2024.
- 🔎 **CSRankings**: Embedded & real-time systems.
- 📊 **ICORE Ranking: A***

[9] Zhuoran Sun, **Marion Sudvarg**, Chris Gill. “Elastic Scheduling for Graceful Degradation of Mixed-Criticality Systems.” International Conference on Real-Time Networks and Systems (RTNS), November 2024.
- 🎓 Work published under my supervision as part of Zhuoran’s master’s project.

[10] **Marion Sudvarg**, Chris Gill, Sanjoy Baruah. “Improved Implicit-Deadline Elastic Scheduling.” IEEE International Symposium on Industrial Embedded Systems (SIES), October 2024.
- 🏅 **Outstanding Paper.**

[11] **Marion Sudvarg**, Ao Li, Daisy Wang, Sanjoy Baruah, Jeremy Buhler, Pontus Ekberg, Chris Gill, Ning Zhang. “Elastic Scheduling for Harmonic Task Systems.” IEEE Real-Time and Embedded Technology and Applications Symposium (RTAS), May 2024.
- 🔎 **CSRankings**: Embedded & real-time systems.
- 📊 **ICORE Ranking: A**
- 💾 **Artifact** Evaluated.

[12] **Marion Sudvarg**, Chenfeng Zhao, Ye Htet, Meagan Konst, Thomas Lang, Nick Song, Roger D. Chamberlain, Jeremy Buhler, James H. Buckley. “HLS Taking Flight: Toward Using High-Level Synthesis Techniques in a Space-Borne Instrument.” 21st ACM International Conference on Computing Frontiers (CF), May 2024.
- 💾 **Artifact** Functional, Available, Reproduced.

[13] **Marion Sudvarg**, Jeremy Buhler, Roger Chamberlain, Chris Gill, James Buckley and Wenlei Chen. “Parameterized Workload Adaptation for Fork-Join Tasks with Dynamic Workloads and Deadlines.” The 29th IEEE International Conference on Embedded and Real-Time Computing Systems and Applications (RTCSA), August 2023.

[14] **Marion Sudvarg**, Sanjoy Baruah, Chris Gill. “Elastic Scheduling for Fixed-Priority Constrained-Deadline Tasks.” 26th IEEE International Symposium on Real-Time Distributed Computing (ISORC), May 2023.
- 🏅 **Best Paper.**

[15] Ao Li*, **Marion Sudvarg***, Han Liu, Zhiyuan Yu, Chris Gill and Ning Zhang. “PolyRhythm: Adaptive Tuning of a Multi-Channel Attack Template for Timing Interference.” IEEE Real-Time Systems Symposium (RTSS), Houston, Texas, December 2022.
- 🔎 **CSRankings**: Embedded & real-time systems.
- 📊 **ICORE Ranking: A***
- Also presented as “Demo: Adaptive Tuning of a Multi-Channel Attack Template for Timing Interference” at VehicleSec 2024 held in conjunction with NDSS.

[16] **Marion Sudvarg** and Chris Gill. “A Concurrency Framework for Priority-Aware Intercomponent Requests in CAmkES on seL4.” The 28th IEEE International Conference on Embedded and Real-Time Computing Systems and Applications (RTCSA), August 2022.

- 🏅 **Best Paper.**

[17] **Marion Sudvarg** and Chris Gill. “Analysis of Federated Scheduling for Integer-Valued Workloads.” International Conference on Real-Time Networks and Systems (RTNS), June 2022.

Computer Science Journal Publications

[18] **Marion Sudvarg**, Christopher Gill, Sanjoy Baruah. “Improved Elastic Scheduling Algorithms for Implicit-Deadline Tasks.” Leibniz Transactions on Embedded Systems (LITES), Special Issue on Industrial Real-Time Systems.

- Extends [7]

[19] Sanjoy Baruah, Pontus Ekberg, **Marion Sudvarg**. “Learning-Assisted Schedulability Analysis: Opportunities and Limitations.” Real-Time Systems, Springer, Summer 2025.

- Also presented as a Work-already-Published at the 46th IEEE Real-Time Systems Symposium (RTSS 2025).

[20] Benjamin Standaert, Fatima Raadia, **Marion Sudvarg**, Sanjoy Baruah, Thidapat Chantem, Nathan Fisher, Christopher Gill. “A Limited-Preemption Scheduling Model Inspired by Security Considerations.” Leibniz Transactions on Embedded Systems (LITES), Volume 10, Issue 1, April 2025.

- 🎓 Work published under my supervision as part of Ben’s master’s thesis.
- Also presented as a Work-already-Published at the 46th IEEE Real-Time Systems Symposium (RTSS 2025).

[21] **Marion Sudvarg**, Oren Bell, Tyler Martin, Benjamin Standaert, Tao Zhang, Sun-Beom Kwon, Chris Gill, Arun Prakash. “Towards a Concurrency Platform for Scalable Multi-Axial Real-Time Hybrid Simulation.” *Frontiers in Built Environment*. Sec. Earthquake Engineering, Volume 10, August 2024.

- Invited paper.
- Part of the special issue, “Experimental Benchmark Control Problem on Multi-axial Real-time Hybrid Simulation.”

[22] **Marion Sudvarg**, Zhuoran Sun, Ao Li, Ning Zhang, and Chris Gill. “Priority-Based Concurrency and Shared Resource Access Mechanisms for Nested Intercomponent Requests in CAmkES.” *Real-Time Systems*, Springer, 2024.

- Extends [13]
- Special issue on selected papers from RTCSA 2022.
- Also presented as a Work-already-Published at the 44th IEEE Real-Time Systems Symposium (RTSS 2023).

[23] **Marion Sudvarg**, Chris Gill, Sanjoy Baruah. “Linear-time admission control for elastic scheduling.” Real-Time Systems, Volume 57, Issue 4, 485–490 (August 2021).

- Also presented as a Work-already-Published at the 42nd IEEE Real-Time Systems Symposium (RTSS 2021).

Computer Science Workshop Publications

[24] Nick Song, **Marion Sudvarg**, Roger Chamberlain. "Connected-Component Labeling Using HLS for High-Energy Particle Physics Instruments." 11th international workshop on Heterogeneous High-Performance Reconfigurable Computing (H^2RC). November 2025.
- Held in conjunction with SC 2025.
- 🎓 Work published under my supervision as part of Nick's master's thesis.

[25] Ye Htet, **Marion Sudvarg**, Honghao Yang, Jeremy Buhler, Roger Chamberlain, James Buckley. "Modeling and Optimizing Real-Time Telescope Interaction for Multi-Wavelength Observation of Gamma-Ray Bursts." Sixth combined workshop on Interactive and Urgent High-Performance Computing (WIUHPC). November 2025.
- Held in conjunction with SC 2025.

[26] **Marion Sudvarg**, Ao Li, Zihan Li, Sanjoy Baruah, Chris Gill, Ning Zhang. Tintin: "PMU Scheduling to Minimize Uncertainty." 19th annual workshop on Operating Systems Platforms for Embedded Real-Time Applications (OSPERT), July 2025.
- Held in conjunction with ECRTS 2025.

[27] **Marion Sudvarg**, Ye Htet, Roger Chamberlain, Jeremy Buhler, James Buckley. "Call for Collaboration: Contributing to Multi-Messenger Astrophysics." 19th annual workshop on Operating Systems Platforms for Embedded Real-Time Applications (OSPERT), July 2025.
- Held in conjunction with ECRTS 2025.

[28] Daisy Wang, Ye Htet, **Marion Sudvarg**, Roger Chamberlain, Jeremy Buhler, James Buckley. "Coordinating Instruments for Multi-Messenger Astrophysics." Special Session on Computer Architectures in Space (CompSpace), May 2025.
- Invited paper.
- Special session held in conjunction with Computing Frontiers 2025.

[29] Benjamin Standaert, **Marion Sudvarg**, Fatima Raadia, Chris Gill. "ILP Representations of Multi-Phase Limited-Preemption Tasks." The Second Workshop on OPtimization for Embedded and ReAl-time systems (OPERA), December 2024.
- Held in conjunction with RTSS 2024.
- 🎓 Work published under my supervision as part of Ben's master's thesis.

[30] Ye Htet, **Marion Sudvarg**, Andrew Butzel, Jeremy Buhler, Roger Chamberlain, James Buckley. "Machine Learning Aboard the ADAPT Gamma-Ray Telescope." The Fifth Workshop on Artificial Intelligence and Machine Learning for Scientific Applications (AI4S), November 2024.
- Held in conjunction with SC 2024.

[31] **Marion Sudvarg**, Ye Htet, Sanjoy Baruah, Jeremy Buhler, Roger Chamberlain, Chris Gill, Jim Buckley. "Adaptive Execution for Real-Time Observations of Astrophysical Transients." 13th International Real-Time Scheduling Open Problems Seminar (RTSOPS), July 2024.
- Held in conjunction with ECRTS 2024.

[32] **Marion Sudvarg**, Chris Gill, Jeremy Buhler. "Subtask-Level Elasticity for Federated Scheduling of Parallel Tasks." The First Workshop on OPtimization for Embedded and ReAl-time systems (OPERA), December 2023.
- Held in conjunction with RTSS 2023.

[33] Ye Htet, **Marion Sudvarg**, Jeremy Buhler, Roger D. Chamberlain, and James Buckley. "Localization of Gamma-ray Bursts in a Balloon-Borne Telescope." The First Workshop on Enabling Predictive Science with Optimization and Uncertainty Quantification in HPC (EPSOUQ), November 2023.
- Held in conjunction with SC 2023.

[34] **M. Sudvarg**, J. Buhler, R. Chamberlain, C. Gill, and J. Buckley. "Work in Progress: Real-Time GRB Localization for the Advanced Particle-astrophysics Telescope." 16th annual workshop on Operating Systems Platforms for Embedded Real-Time Applications (OSPERT), July 2022.
- Held in conjunction with ECRTS 2022.

[35] Jacob Wheelock, William Kanu, **Marion Sudvarg**, Zhili Xiao, Jeremy D. Buhler, Roger D. Chamberlain, and James H. Buckley. "Supporting multi-messenger astrophysics with fast gamma-ray burst localization." In Proc. of IEEE/ACM HPC for Urgent Decision Making Workshop (UrgentHPC), November 2021.
- Held in conjunction with SC 2021.

Physics Conference Publications

[36] **Marion Sudvarg** et al. "FPGA-Based Data Processing using High-Level Synthesis on the Antarctic Demonstrator for the Advanced Particle-astrophysics Telescope (ADAPT)." In Proc. of 39th International Cosmic Ray Conference — PoS(ICRC2025), July 2025.

[37] Jeremy Buhler and **Marion Sudvarg**. "Real-time Likelihood Map Generation to Localize Short-duration Gamma-ray Transients." In Proc. of 39th International Cosmic Ray Conference — PoS(ICRC2025), July 2025.

[38] Ye Htet, **Marion Sudvarg**, et al. "Performance Modeling and Improvements on the GRB Source Localization Streaming Pipeline Aboard the Antarctic Demonstrator for the Advanced Particle-Astrophysics Telescope (ADAPT)." In Proc. of 39th International Cosmic Ray Conference — PoS(ICRC2025), July 2025.

[39] Wenlei Chen, James Buckley, and **Marion Sudvarg**. "Instrument Response Functions of the Antarctic Demonstrator for the Advanced Particle-astrophysics Telescope (ADAPT)." In Proc. of 39th International Cosmic Ray Conference — PoS(ICRC2025), July 2025.

[40] **Marion Sudvarg** et al. "Front-End Computational Modeling and Design for the Antarctic Demonstrator for the Advanced Particle-astrophysics Telescope." In Proc. of 38th International Cosmic Ray Conference – PoS(ICRC2023), July 2023.

[41] Ye Htet, **Marion Sudvarg**, et al. "Prompt and Accurate GRB Source Localization Aboard the Advanced Particle Astrophysics Telescope (APT) and its Antarctic Demonstrator (ADAPT)." In Proc. of 38th International Cosmic Ray Conference – PoS(ICRC2023), July 2023.

[42] Wenlei Chen, James H. Buckley, et al. "Simulation of the instrument performance of the Antarctic Demonstrator for the Advanced Particle-astrophysics Telescope in the presence of the MeV background." In Proc. of 38th International Cosmic Ray Conference – PoS(ICRC2023), July 2023.

[43] **Marion Sudvarg**, Jeremy Buhler, James H. Buckley, Wenlei Chen et al. "A Fast GRB Source Localization Pipeline for the Advanced Particle-astrophysics Telescope." In Proc. of 37th International Cosmic Ray Conference — PoS(ICRC2021), volume 395, pages 588:1–588:9, July 2021.

[44] James Buckley, Samer Alnussirat, Corrado Altomare, et al. "The Advanced Particle-astrophysics Telescope (APT) Project Status." In Proc. of 37th International Cosmic Ray Conference — PoS(ICRC2021), volume 395, pages 655:1–655:9, July 2021.

[45] Wenlei Chen, James H. Buckley, Samer Alnussirat, et al. “The Advanced Particle-astrophysics Telescope: Simulation of the Instrument Performance for Gamma-Ray Detection.” In Proc. of 37th International Cosmic Ray Conference — PoS(ICRC2021), volume 395, pages 590:1–590:9, July 2021.

[46] Zachary Hughes, Samer Alnussirat, Corrado Altomare, et al. “Characterization of a prototype imaging calorimeter for the Advanced Particle-astrophysics Telescope from an Antarctic balloon flight and CERN beam test.” In Proc. of 37th International Cosmic Ray Conference — PoS(ICRC2021), volume 395, pages 137:1–137:9, July 2021.

Conference Posters

[47] **Marion Sudvarg**, Izabella Pastrana, Richard Bose, Blake Bal, Roger Chamberlain, James Buckley. “Front-End Data Acquisition and Signal Processing for the ADAPT Telescope.” 22nd Divisional Meeting of the High Energy Astrophysics Division (HEAD), American Astronomical Society, October 2025.

[48] Ye Htet, **Marion Sudvarg**, Jeremy Buhler, Roger Chamberlain, James Buckley. “Neural Network Extensions for the GRB Localization Pipeline on the ADAPT Gamma-Ray Telescope.” 22nd Divisional Meeting of the High Energy Astrophysics Division, American Astronomical Society, October 2025.

[49] **Marion Sudvarg**, Ye Htet, Jeremy Buhler, Roger Chamberlain, Chris Gill, James Buckley, Wenlei Chen. “Adaptive Real-Time Computation for Prompt Localization of Transients.” 21st Divisional Meeting of the High Energy Astrophysics Division (HEAD), American Astronomical Society, March 2024.

[50] Ye Htet, **Marion Sudvarg**, Jeremy Buhler, Roger Chamberlain. “A Computational Pipeline for Prompt Gamma-Ray Burst Localization Aboard APT and ADAPT.” 21st Divisional Meeting of the High Energy Astrophysics Division (HEAD), American Astronomical Society, March 2024.

[51] Jamie Shin, **Marion Sudvarg**, Jeremy Buhler, James Buckley. “Accelerating Compton Imaging of Astrophysical Sources in Python.” 21st Divisional Meeting of the High Energy Astrophysics Division (HEAD), American Astronomical Society, March 2024.

[52] **Marion Sudvarg**, Meagan Konst, Thomas Lang, Diana Pacheco-Garcia, Roger Chamberlain, Jeremy Buhler, James Buckley. “Design of Front-end Signal Processing for the Advanced Particle-astrophysics Telescope.” 20th Divisional Meeting of the High Energy Astrophysics Division (HEAD), American Astronomical Society, March 2023.

[53] Ye Htet, **Marion Sudvarg**, Jeremy Buhler, Roger Chamberlain, James Buckley. “Prompt, Accurate Localization of Gamma-Ray Bursts in the Advanced Particle-astrophysics Telescope.” 20th Divisional Meeting of the High Energy Astrophysics Division (HEAD), American Astronomical Society, March 2023.

[54] Wenlei Chen, James Buckley, Roger Chamberlain, **Marion Sudvarg**. “The Advanced Particle-astrophysics Telescope: Reconstruction of the MeV gamma-ray sky and estimation of point-source sensitivity in the presence of the background.” 20th Divisional Meeting of the High Energy Astrophysics Division (HEAD), American Astronomical Society, March 2023.

[55] **Marion Sudvarg**, Jacob Wheelock, Jeremy D. Buhler, James H. Buckley, and Wenlei Chen. “Parallel GRB source localization pipelines for the advanced particle-astrophysics telescope.” In Proc. of IEEE/ACM International Conference for High Performance Computing, Networking, Storage, and Analysis (SC), November 2021.

- **Peer reviewed.**

INVITED TALKS

October 2025: COSIfest 2025
Invited to present a talk titled, "ADAPT and COSI Synergies" during the COSI science team's second annual collaboration meeting.

October 2025: 22nd Meeting of the High Energy Astrophysics Division (HEAD) of the AAS
Invited to present a talk titled, "Real-Time GRB Localization on the Antarctic Demonstrator for the Advanced Particle-astrophysics Telescope (ADAPT)" at a special session of the 22nd AAS HEAD meeting titled, "Balloon and sounding rocket technology developments: a platform for early-career instrumentation scientists."

July 2024: Industrial Challenge, ECRTS
Submitted an early-stage proposal for the annual industrial challenge at the 36th Euromicro Conference on Real-Time Systems (ECRTS), July, 2024. The proposal, titled "Elastic Scheduling for ARM AR HUD," outlined an approach for adaptive scheduling to guarantee timeliness in dynamic driving environments for ARM's proposed augmented-reality heads up display (AR HUD), a system to project information in real-time onto a vehicle's windshield to enhance driver awareness. It was accepted by three members of ARM Research to be presented during the industrial session.

April 2023: Colloquium, Saint Louis University
Presented a talk titled, "Constrained Optimization of Elastic Task Adaptation in Real-Time Systems" for Saint Louis University's computer science colloquium.

TEACHING

All listed courses were taught at Washington University in St. Louis.

2025FL: CSE 5402S "Concurrency and Memory Safe System Software Development"
Guest lectured on Tuesday, September 23. Topics: Operator Overloading and Closures.

2024FL: CSE 565M "Acceleration of Algorithms in Reconfigurable Logic"
Guest lectured on Tuesday, November 19. Topic: HLS-Based FPGA Data Preprocessing on the ADAPT High-Energy Astrophysics Telescope.

2023FL: CSE 428S "Multi-Paradigm Programming in C++"
Guest lectured on Thursday, October 19. Topic: Standard IO Library.

2023SP: CSE 522S "Advanced Operating Systems"
Co-instructed the course, further refining the material based on feedback and experience from the previous semester.

2022FL: CSE 428S "Multi-Paradigm Programming in C++"
Guest lectured on Tuesday, November 1. Topic: Overloading and Templates.

2022SP: CSE 522S "Advanced Operating Systems"
Co-instructed the graduate level operating systems course that follows CSE 422S. Led an effort to change the focus and scope of the course. Developed new lecture materials and assignments, which composed most of the course syllabus.

2021FL: CSE 422S “Operating Systems Organization”
Guest lectured on Monday, September 20 and Wednesday, September 22. Topics: Time Sources and Timing, Kernel Tracing and Debugging.

2021SP: CSE 422S “Operating Systems Organization”
Performed further **syllabus refinement**, following observations from the previous semester and semester-end student course evaluations. Also assisted with grading final projects.

2020FL: CSE 422S “Operating Systems Organization”
Co-instructed the advanced-undergraduate operating systems course at Washington University in St. Louis, and led a significant restructuring of course content, under the supervision of Professor Chris Gill. Refined content is still being used in the current syllabus.

COLLABORATIONS

APT and ADAPT (October 2019 – Present)
The Advanced Particle-astrophysics Telescope (APT) is a planned space-based observatory designed to localize MeV to TeV transients such as gamma-ray bursts (GRBs) in real time using onboard computational hardware. I am the software and firmware lead for the Antarctic Demonstrator for APT (ADAPT), a NASA-funded, prototype high-altitude balloon mission anticipated to fly during the 2026–27 season.

AstroRTS (June 2020 – Present)
I formed the AstroRTS collaboration to bridge the expertise of the real-time systems community with open problems in time-domain and multi-messenger astrophysics, with a focus on deadline-constrained localization of transient astrophysical phenomena, e.g., GRBs. This involves coordination of prompt transient detection and reconstruction of spatial probability maps describing their location (e.g., as will be done aboard ADAPT and APT), followed by search of the probability space by optical telescopes, which must detect the transient within captured images in real time. The collaboration currently spans three institutions across two continents, and we are working to build international partnerships with participating observatories.

COSI Science Team (September 2025 – Present)
The Compton Spectrometer and Imager (COSI) is a NASA Small Explorers (SMEX) mission planned for launch in 2027. COSI is a gamma-ray telescope that will provide imaging, spectroscopy, and polarimetry of both persistent gamma-ray sources and GRBs. Beginning in March 2023, I have worked to accelerate COSI’s offline data analysis workflows, including gamma-ray image reconstruction and GRB likelihood mapping, achieving orders of magnitude speedups. I was invited to join the science team as an official member in September 2025.

MechWorks (April 2023 – August 2024)
A joint collaboration between Purdue University mechanical and structural engineering and the Washington University in St. Louis computer science and engineering department. I developed scheduling theory and platforms to support provably schedulable parallel execution for real-time hybrid simulation (RTHS) of structural response to earthquakes.

STUDENTS SUPERVISED

During my PhD studies and postdoctoral appointment, I have had the pleasure of mentoring and supervising the work of several talented undergraduate, master's, and PhD students.

Primary Supervision

- Punit Turlapati, PhD advisee, Fall 2026 – Present.
- Jenny Yu, undergraduate student, AstroRTS project, Summer and Fall 2025, Spring 2026.
- Jesse Myoung, undergraduate student, ADMX experiment, Summer and Fall 2025, Spring 2026.
- Owen Cromly, undergraduate student, ADMX experiment, Spring 2026.
- Qinzhou (Nick) Song, undergraduate and master's student, APT collaboration, Summer and Fall 2023, Fall 2024, and Spring 2025.
    - Publications: [12], [24], [40]
- Benjamin Standaert, undergraduate student and master's thesis, Fall 2023 through Fall 2024.
    - Publications: [20], [21], [29]
- Boran (Brant) Yang, REU student, APT collaboration, Summer and Fall 2024.
    - Publications: [36]
- Nhan (Bill) Nguyen, undergraduate student, APT collaboration, Fall 2024.
- Alson Yao, undergraduate student, Fall 2024.
- Swapnil Das, REU student, APT collaboration, Summer 2024.
- Ethan Woolbert, undergraduate student, APT collaboration, Spring 2024.
- Jack Heuberger, master's student, APT collaboration, Fall 2023 and Spring 2024.
- Jacob Silbert, undergraduate student, APT collaboration, Fall 2023.
- Ulysses Atkeson, undergraduate student, APT collaboration, Spring 2023.
    - Publications: [40]

Joint Supervision and Mentoring

- Zhuoran (Jordan) Sun, master's and PhD studies, Fall 2022 though present.
    - Publications: [9], [22]
- Longhao Huang, master's project, APT collaboration, Spring 2024 through Spring 2025.
    - Publications: [36]
- Augustus (Gus) Thomas, undergraduate student, APT and COSI collaboration, Fall 2024 through Spring 2025.
- Tobias Pristupin, undergraduate student, Fall 2023.
- Thomas Lang, undergraduate student, APT collaboration, Spring and Summer 2023.
    - Publications: [12], [40], [52]
- Muhan Yu, undergraduate student, Summer 2023.
- Diana Pacheco-Garcia, undergraduate student, Fall 2022.
    - Publications: [40], [52]
- Will Gozlan, master's project, Spring and Fall 2022.

SERVICE and OTHER ACTIVITIES

Journal, Conference, and Workshop Reviewing and Program Committees

- **Workshop Chair, RAGE 2027**
    - The 6th Real-time and intelligent Edge computing workshop (RAGE), May 2027.
    - Held as part of CPS-IoT Week.

- **External Reviewer, RTSS 2027**
  - Assigned as an external reviewer for the 47th IEEE Symposium on Real-Time Systems (RTSS 2026).
- **TPC Member, RTNS 2026**
  - Technical program committee member, 34th International Conference on Real-Time Networks and Systems (RTNS), November 2026.
- **Reviewer, Springer Real-Time Systems, Summer 2026.**
- **TPC Member, VehicleSec 2026 Demos, Posters, and Tutorials**
  - Technical program committee member, Demos, Posters, and Tutorials session, 4th USENIX Symposium on Vehicle Security and Privacy (VehicleSec).
  - Held concurrently with the 2026 USENIX Security Symposium.
- **TPC Member, ECRTS 2026**
  - Technical program committee member, 38th Euromicro Conference on Real-Time Systems (ECRTS), July 2026.
- 🪑 **Workshop Chair, OSPERT 2026**
  - Workshop on Operating Systems Platforms for Embedded Real-Time applications (OSPERT), July 2026.
  - Held concurrently with ECRTS 2026.
- **TPC Member, RTSOPS 2026**
  - Technical program committee member, 15th International Real-Time Systems Open Problems Seminar (RTSOPS).
  - Held concurrently with ECRTS 2026.
- **TPC Member, RTAS 2026**
  - Technical program committee member, 32nd IEEE Real-Time and Embedded Technology and Applications Symposium (RTAS), May 2026.
  - Held as part of CPS-IoT Week.
  - 🏅 **Best Reviewer Award**
- **Artifact Evaluator, RTAS 2026**
  - Artifact evaluation program committee member, 32nd IEEE Real-Time and Embedded Technology and Applications Symposium (RTAS), May 2026.
  - Held as part of CPS-IoT Week.
- **TPC Member, Brief Presentations, RTAS 2026**
  - Program committee member, Brief Presentations Track, 32nd IEEE Real-Time and Embedded Technology and Applications Symposium (RTAS), May 2026.
  - Held as part of CPS-IoT Week.
- **TPC Member, RAGE 2026**
  - Program committee member, the 5th Real-time and intelligent Edge computing workshop (RAGE), May 2026.
  - Held as part of CPS-IoT Week.
- **Reviewer, Computer Methods and Programs in Biomedicine, Spring 2026**
- 🪑 **Workshop Co-Chair, OPERA 2025**
  - Workshop on OPtimization for Embedded and ReAl-time systems (OPERA), December 2025.
  - Held concurrently with RTSS 2025.
- **Reviewer, Springer Real-Time Systems, Fall 2025**
- **TPC Member, Brief Presentations, RTSS 2025**
  - Program committee member, Brief Presentations Track, Real-Time Systems Symposium (RTSS), December 2025.
- **TPC Member, Posters and Demos, RTCSA 2025**
  - Program committee member, Posters and Demos session, IEEE International Conference on Embedded and Real-Time Computing Systems and Applications (RTCSA), August 2025.
- **Reviewer, Journal of Systems Architecture, Summer 2025**
- **Reviewer, IEEE Transactions on Computers, Summer 2025**
- 🪑 **Workshop Co-Chair, OSPERT 2025**

    - Workshop on Operating Systems Platforms for Embedded Real-Time applications (OSPERT), July 2025.
    - Held concurrently with ECRTS 2025.
- **Artifact Evaluator, ECRTS 2025**
    - Artifact evaluation program committee member, Euromicro Conference on Real-Time Systems (ECRTS), July 2025.
- **Best Paper Award Committee, ECRTS 2025**
    - Served on committee to select Best Paper Award among outstanding submissions.
    - Euromicro Conference on Real-Time Systems (ECRTS), July 2025.
- **TPC Member, OPERA 2025**
    - Program committee member, Workshop on Optimization for Embedded and Real-Time Systems (OPERA), December 2024.
    - Held concurrently with RTSS 2024.
- **TPC Member, JRWRTC 2024**
    - Program committee member, Junior Researcher Workshop on Real-Time Computing (JRWRTC), November 2024.
    - Held concurrently with RTNS 2024.
- **Artifact Evaluator, ECRTS 2024**
    - Artifact evaluation program committee member, Euromicro Conference on Real-Time Systems (ECRTS), July 2024.
- **Reviewer, IEEE Transactions on Computers, Fall 2022**

Other Conference and Workshop Service Activities

- **Travel Grant Reviewer, CPS-IoT Week 2026.**
- **Session Chair, RTAS 2026**
    - Chair of session, “Industrial Challenge Presentation from Bosch.”
- **Session Chair, RAGE 2026**
    - Chair of session, “Real-Time and Reliable Edge Computing.”
- **Publicity Chair, RTSS 2025**
- **Discussant, OPERA 2024**
    - Discussant for paper, Catherine E. Nemitz and Tanya Amert, “Optimizing Lock Granularity for Non-Nested Resource Access under the Priority-Ceiling Protocol.”
- **Session Chair, RTNS 2024**
    - Chair of session, “Power-aware, Fault-tolerant Systems.”
- **Discussant, OPERA 2023**
    - Discussant for paper, Gaspard et al., “Feasibility analysis of real-time periodic multi-phase tasks on unrelated multiprocessor platforms.”

Thesis Committees

- Thesis committee member, Lydia Klaus, Master of Science in Computer Science, “Board-Level Operating System Infrastructure in Rust.” April 22, 2026.
- Thesis committee member, Nick Song, Master of Science in Computer Science, “Generalization of ADAPT HLS Computational Pipeline.” April 30, 2025.
- Thesis committee member, Benjamin Standaert, Master of Science in Computer Science, “Schedulability Analysis of Multi-Phase Limited-Preemption Tasks.” December 6, 2024.

Associate Editor, Springer Real-Time Systems Journal (May 2026 – Present)

Web Chair, IEEE TCRTS (January 2026 – December 2027)
I manage updates to the website for the IEEE Technical Committee on Real-Time Systems. A major modernization, redesign, and content update effort is underway.

Advisor, WashU Satellite (Fall 2024 – Present)
WashU Satellite is a student-led, primarily undergraduate design team with planned CubeSat and related missions, including the fast-slewing optical ADAPT Incidence Resolution and Imaging Subsystem (AIRIS) to fly as a piggyback instrument with the ADAPT mission. I act as co-adviser and mentor to the group, along with Jim Buckley in the physics department and Andrew Clark in the Electrical and Systems Engineering department.

Postdoc Representative, Physics Department (Fall 2024 – Present)
I serve as one of the two postdocs in the physics department to bring questions and concerns from the postdocs to the department faculty, and to attend faculty meetings to report news and departmental issues back to the postdocs.

Computing Committee, Physics Department (Fall 2024 – Present)
I currently serve on the Computing Committee for the Department of at Washington University in St. Louis to advocate for students and postdocs and educate them on the availability of departmental computational resources for analysis and simulations.

Friends of Honduras – Board of Directors (2017 – Present)
Friends of Honduras partners with the remote communities surrounding San Marco de Sierra, Honduras to bring medical and educational resources, agricultural support, clean water technologies, and hope to the poorest of the poor in the region. I have served on the board of directors since its inception, and I have travelled to the same villages 9 times since 2011 (originally under the umbrella of a different organization).

Graduate Student and Postdoc Advisory Council (Fall 2023 – Spring 2024)
I served on the Graduate Student and Postdoc Advisory Council to the Center for Teaching and Learning (CTL) at Washington University in St. Louis during the 2023 academic year. I assisted the CTL in making decisions related to graduate student and postdoc programming. I also help to coordinate monthly events, including faculty panel discussions and informal gatherings, to allow graduate students and postdocs to gather together and discuss relevant teaching and learning related topics.

Graduate Council – Executive Committee (Fall 2020 – Spring 2021)
I served as the Computer Science and Engineering department's student representative to the Graduate Council of Washington University in St. Louis. I was also selected to be a member of the Graduate Council's Executive Committee.